

ABSTRACT

A process for making improved borderless contact structure to salicide field effect transistors (FETs) has been achieved. Salicide FETs are formed on device areas surrounded by a shallow trench isolation (STI) using a first rapid thermal anneal (RTA-1) to form a metal silicide on the source/drain contacts and the gate electrodes, and a second rapid thermal anneal (RTA-2) is delayed until after forming a borderless contact opening structures to the source/drain areas of the FETs. An etch stop (Si_3N_4) layer and an interlevel dielectric (ILD) layer is deposited, and borderless contact openings, extending over the STI, are etched in the ILD and etch stop layers to the source/drain areas. The contact openings across the substrate must be overetched to insure that all contacts are open. This results in over-etched region in the STI at the source/drain-STI interface that result in source/drain-to-substrate shorts when metal plugs are formed in the contact openings. This invention uses a contact opening implant to dope and modified the junction profile in the source/drain contact around the STI over etched region to prevent electrical shorts. The second RTA (RTA-2) is then used to concurrently reduce the silicide sheet resistance and to electrically activate the contact opening implanted dopant. Metal plugs can now be formed without causing shorts.